



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IX

75 Hawthorne Street

San Francisco, CA 94105-3901

February 27, 1995

**Joseph J. Holonich, Chief
High-Level Waste and Uranium Recovery Branch
Division of Waste Management
Office of Nuclear Material Safety and Safeguards
Mail Stop TWFN 7J-9
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555**

Dear Mr. Holonich:

The U.S. Environmental Protection Agency (EPA) has reviewed the Draft Environmental Impact Statement (DEIS) to Construct and Operate the Crownpoint Uranium Solution Mining Project, McKinley County, New Mexico. Our review and comments are provided pursuant to the National Environmental Policy Act (NEPA), the Council on Environmental Quality's NEPA Implementation Regulations at 40 C.F.R. 1500-1508, and Clean Air Act §309.

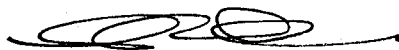
The DEIS evaluates alternatives for construction and operation of facilities to recover uranium at three separate locations in McKinley County, New Mexico. The preferred alternative involves construction of injection and extraction wells, ion exchange plants, retention ponds, and support facilities. In situ leach mining and ion exchange would be conducted to recover uranium at each of the three sites. A central plant would provide drying and packaging of the "yellowcake" for transport offsite. Uranium recovery activities would be conducted at the Church Rock, Unit 1, and Crownpoint sites for eight, 17, and 19 years, respectively.

We have rated this DEIS as EO-2 -- Environmental Objections-Insufficient Information (see enclosed "Summary of Rating Definitions and Follow-Up Actions"). Our objections to the proposed project are based on its proximity to domestic supply wells and residences and insufficient hydrogeologic modelling and field testing to ensure a completely closed system. Additional information is needed in the Final Environmental Impact Statement (FEIS) regarding the results of hydrogeologic modelling and field tests, including the potential for, and environmental impacts of, contaminated groundwater migrating off-site as a result of injection activities; aquifer restoration; and effects of drawdown of supply wells for the City of Crownpoint. We believe that additional studies must be performed at the project sites

and this information provided in the FEIS. The FEIS should also include additional information regarding permitting, spill response, management of sludges and other process wastes, and Radionuclide National Emissions Standards for Hazardous Air Pollutants. Our specific comments are attached.

We appreciate the opportunity to review this DEIS. Please send two copies of the FEIS to this office at the same time it is officially filed with our Washington, D.C., office. If you have any questions, please contact me at (415) 744-1584, or have your staff contact Jeanne Geselbracht at (415) 744-1576.

Sincerely,



David J. Farrel, Acting Chief
Office of Federal Activities

Enclosures

2376/95-016

cc: Sadie Hoskie, Navajo Nation EPA
BLM, Albuquerque
BIA, Gallup
Peg Rogers, Navajo Nation Dept. of Justice
Judith Espinosa, State of New Mexico Environment Dept.
Yvonne Vallette, EPA Region 6

SUMMARY OF RATING DEFINITIONS AND FOLLOW-UP ACTION

Environmental Impact of the Action

LO-Lack of Objections

The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC-Environmental Concerns

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts.

EO-Environmental Objections

The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU-Environmentally Unsatisfactory

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of environmental quality, public health or welfare. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommend for referral to the Council on Environmental Quality (CEQ).

Adequacy of the Impact Statement

Category 1-Adequate

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2-Insufficient Information

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

Category 3-Inadequate

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

*From: EPA Manual 1640, "Policy and Procedures for the Review of Federal Actions Impacting the Environment."

General Comments

Hydro Resources, Inc. (HRI) has applied to the Nuclear Regulatory Commission (NRC) for a license to construct and operate facilities to recover uranium in three separate locations. HRI's project involves the installation and operation of "Class III" uranium mining injection wells regulated under the Safe Drinking Water Act (SDWA), 42 U.S.C. §300f et seq. The following parcels of land meet the definition of "Indian lands" set forth at 40 C.F.R. §144.3: Church Rock area - Section 17, T16N, R16W (held in trust by the United States for the benefit of the Navajo Nation (tribal trust)); all of Unit 1 area, including northwest 1/4 of Section 24, T17N, R13W (allotments held in trust for individual Indians (allotments)); Crownpoint area - southern 1/2 of Section 19, T17N, R12W (tribal trust), and western 1/2 of Section 29, T17N, R12W. As such, HRI's Class III injection wells on Indian lands are subject to the requirements found at 40 C.F.R. Parts, 124, 144, 146, 147, subpart HHH, and 148. Therefore, among other things, HRI is required to submit a permit application and a request for an aquifer exemption for the wells on the Indian lands (as described above) to EPA-Region 9.

HRI has not submitted a permit application to EPA for the Crownpoint area. On October 23, 1992, HRI submitted a permit application and a request for an aquifer exemption to EPA-Region 9 for the Unit 1 area of the proposed project. After EPA-Region 9 informed HRI that EPA could not grant the exemption because there is a drinking water supply well within HRI's proposed project, on July 13, 1993, HRI withdrew its permit application for the Unit 1 area. To date, despite being notified by EPA (twice in writing), HRI has failed to submit a permit application (and a request for an aquifer exemption) for the Church Rock area. HRI cannot begin construction of its wells until it receives its Class III UIC permit. In the event that HRI does construct (or operate) its UIC wells without the proper EPA-issued permits (and aquifer exemptions), HRI will be subject to criminal and/or civil enforcement pursuant to section 300h-2 of the SDWA, 42 U.S.C. §1423. EPA recommends that NRC not sign a Record of Decision or approve HRI's license until HRI has applied for all appropriate permits and exemptions from EPA-Region 9.

EPA requests that NRC, to the extent allowed under its laws and regulations, include in any license a provision in which HRI agrees to indemnify the U.S. for the costs of any environmental damage and/or remediation. Similarly, we request that the Bureau of Land Management and Bureau of Indian Affairs include, in any minerals operating lease, a provision in which HRI agrees to

indemnify the U.S. for the costs of any required environmental damage and/or remediation.

EPA considers these indemnity provisions very important. At other mining sites the Federal and State agencies have borne much or all of the cost of necessary cleanups because responsible parties were not able and/or willing to pay these costs. EPA would like to prevent a future requirement for the expenditure of federal fiscal resources.

Groundwater

The proposed technology of injecting solutions into uranium bearing strata has been practiced in New Mexico for many years. However, such *in-situ* operations have caused groundwater contamination since the control of oxidants in strata is difficult, and once oxidation begins, it mobilizes uranium in aquifers. Furthermore, *lixiviant* movement through the strata also mobilizes heavy metals, and their control is often quite difficult because treatment of dilute metals (e.g., arsenic, selenium, vanadium) in large masses of groundwater is not well understood or is very costly.

In the recovery process, uranium would be oxidized and dissolved by the *lixiviant* solution injected into the ore zone. The dissolution of uranium would continue as long as the production zone remains in an oxidized state. Even if injection ceases for any reason, the recovery wells must remain in full operation to prevent the migration of any dissolved uranyl species or trace metals from the mining zone. The FEIS should address this issue in detail.

The Westwater Canyon Member of the Morrison formation is an important regional aquifer. On page 3-9, the DEIS states that some of the sandstone units in the area are known to exhibit jointing and fracturing in the subsurface. Such fracturing could lead to water movement throughout the Westwater unit in a fashion very difficult to model. Furthermore, the DEIS references Reed and Werts (1967), which concluded that the Old Church Rock mine experienced excessive water seepage owing to fracture zones in the Westwater Canyon sandstones. Since such fracturing appears to exist, it appears that the formation is not confined.

The DEIS reports that the injection pressure at the well head would not exceed 0.40 psi per foot of well depth. 40 C.F.R. §146.33 (a)(1) stipulates that "injection pressure at the wellhead shall be calculated so as to assure that the pressure in the injection zone during injection does not initiate new fractures or propagate existing fractures in the injection zone."

In light of the exhibited jointing and fracturing in the subsurface (DEIS, p. 3-9), it is probable that pressure increases may lead to propagation of existing fractures. HRI must submit results of field tests and investigations to verify: (1) the maximum injection pressure or fracture gradient for the Westwater formation; and (2) the cumulative effects of multiple injection wells on the fracturing or propagation of fractures in the production zone. This information should be included in the FEIS.

Lixiviant solution injected into the ore zone oxidizes and dissolves the uranium present. In the ore, the principal products of interest to HRI that result from the reactions are a soluble uranyl tricarboxylate complex $[\text{Na}_4\text{UO}_2(\text{CO}_2)_3]$ and a bicarbonate complex $[\text{UO}_2(\text{CO}_3)_2]^{2-}$. In such an oxidizing environment, other uranyl (+VI) species, (i.e., UO_2^{2+} , UO_2CO_3^0 , UO_2SO_4^0 , and UO_2OH^+) are also mobilized and transported. EPA believes it is critical that all mobilized uranyl species be recovered in the ion exchange (IX) units. Moreover, all monitoring well samples must be analyzed for total uranium. Analyzing for the uranyl tricarboxylate and bicarbonate complexes only would not be sufficient.

HRI proposes to establish baseline groundwater quality in the production zone and in overlying aquifers as part of the Aquifer Restoration Plan. HRI should be aware that, according to 40 C.F.R. §147.3014(b), EPA may require monitoring wells to be completed into underground sources of drinking water (USDWs) below the injection zone.

The DEIS indicates that both the Church Rock and Crownpoint lease areas were developed earlier for uranium mining using underground methods, leaving behind open mine shafts. The open shafts may provide possible conduits for fluid migration from the ore zone to overlying USDWs. Commingling of pregnant lixiviant with water in overlying USDWs would degrade the water quality. The shafts and any wells or holes that exhibit the potential to promote fluid migration should be plugged in a manner which will not allow the movement of fluids either into or between USDWs. This should be discussed in the FEIS and HRI's permit application referenced in our "General Comments."

According to the DEIS (p. 3-12), the natural potentiometric surface of the Westwater aquifer in the Crownpoint area slopes north-north eastward. The pumping from drinking water supply wells in the City of Crownpoint has caused the aquifer gradient in the vicinity of the processing plant to slope eastward toward Navajo Tribal Utility Authority (NTUA) No. 1. Competing water production between the water supply wells in the City of

Crownpoint and the uranium mining recovery wells may cause the uranium-enriched pregnant solution to migrate off site. Should the cones of depression (drawdown) for the water supply wells encompass the uranium mining zone, and if the capture zones of the supply wells are large enough to cause water flowing from the mine zone to accumulate at any of the supply wells, any chemical species (uranium, radium, and trace metals) would collect in the water supply wells. NTUA No. 1 could potentially serve as a sink for a large volume of pregnant lixiviant migrating off site. HRI must perform and submit results of a study to determine the effect of mining operations on the City of Crownpoint's drinking water supply wells. The FEIS should include this information.

According to the DEIS (p. 3-16), HRI performed a two day pump test near Crownpoint. The information regarding the test results is inconclusive and insufficient. Data showing observed drawdowns in the monitoring wells and the effects on the Crownpoint water supply wells are needed. Also, the EPA believes that a single two day pump test yields insufficient data to determine the integrity of a confining layer. A two day test may not be sufficient to show communication between a confining layer and an aquifer. Because of the time delay for water to enter the pumped aquifer, an aquifer may appear nonleaky over several hours or days of pumping. A pump test run for a longer period of time may have invoked the transmission of water across the confining layer and shown the confining layer to be leaky and not impermeable. We recommend that HRI conduct additional pump tests and include the results in the FEIS.

Likewise, pump test data for the Church Rock site are lacking in the DEIS (p. 3-16). The DEIS only mentions wells completed in the Dakota and Cow Springs aquifers. Information on the duration of the test and whether any monitoring wells were completed within the mineralized zone should be included in the FEIS.

The DEIS states that as long as pumping continues in the well fields contaminant flow would be toward the recovery wells and away from other portions of the aquifer. This would be true only if aquifer drawdown could easily be predicted, and there were complete control over the pressures at all wells and uniform cones of depression around each well. It is unlikely that such conditions would exist in the field. Controlling down hole pressure at in-situ operations is often difficult and frequently very different from modelled results.

The DEIS (p. 4-2) indicates that the expected aquifer drawdown during the project would be 40 feet for the Church Rock site and 50 feet for the Crownpoint site. The model prepared by Geraghty and Miller for HRI used an 8-year and 7-year production and

restoration schedule for Church Rock and Crownpoint, respectively, as the time input in predicting the expected cone of depression. If the life expectancy of the project at Unit 1 and Crownpoint is 17 and 19-years, respectively, then the model would underestimate the expected drawdown at the conclusion of the project. In computing the cone of depression, did the model account for the cumulative effects of the mining recovery wells and the water production wells in the City of Crownpoint? The EIS must address the impact that mining would have on the capability of NTUA and BIA wells to continue delivery of water at a desired capacity. Would the expected drawdown deplete water as a resource and require the construction of more wells to meet the demand of the community?

Pilot test results indicate that there is a potential for groundwater to end up with elevated levels of molybdenum and selenium (DEIS, pp. 4-7,8,9). The tests indicated that flushing the mine zone may reduce contaminants to statutory levels. However, this assumes that the ore body does not contain pockets where heavy metals are in higher concentrations than anticipated. This is not substantiated by data in the DEIS. The FEIS should address this issue.

Other trace elements such as arsenic, vanadium, iron and manganese would also be mobilized by the leaching process. The transport and fate of mobilized trace elements in groundwater and in waste streams at the proposed project sites are unclear in the DEIS. The FEIS should describe the transport and fate of all substances that could be incidentally released by the leaching process. In addition, the FEIS should include an estimate of the amount of time it would take to restore the aquifer to baseline conditions.

HRI would land-apply treated water on as many as 139 acres. The water would be regulated by irrigation standards adopted by the State of New Mexico. The FEIS should provide these standards and describe the potential effects irrigation could have on the Westwater Canyon Member aquifer. Table 4-12 in the DEIS (p. 4-27) outlines the monitoring program for the proposed project. Table 4-12 in the FEIS should include sampling of treated effluent prior to land application. The FEIS should describe and discuss how wastewater would be transported to irrigation areas and what the impacts would be (e.g., surface disturbance for pipelines).

The FEIS should indicate whether any springs, seeps, or ephemeral streams would be affected by the project. Would a permit be required under Clean Water Act §404 for any aspect of the project (e.g., for disturbance of the arroyo at the Church Rock site)?

Spill Prevention and Response

The DEIS (p. 2-10) indicates that secondary containment is designed to hold only the contents of the largest vessel at each of the three processing units. Such a design would not contain all solutions if massive failure took place. We recommend that NRC seriously consider requiring that secondary containment accommodate 100 percent of all solutions at each processing plant.

The DEIS states that HRI would transport yellowcake slurry to the main processing unit at Crownpoint in semi-trailer tankers (p. 2-14). It is unclear how routes would be selected to maximize safety and reduce the chance of accidents. Response plans for a spill during transportation of yellowcake are not included in the DEIS. The FEIS should address these issues.

The project sites are located very close to residences. The Crownpoint unit is located on the western edge of town, and some wells could be located within 1000 feet of residences. Although project activities are designed to safely operate, design failures (e.g., well blow-outs, pipeline ruptures, transportation spills) could occur. According to the DEIS (p. 4-21), the worst-case event would involve a major pipeline rupture going unchecked for an hour at full operating capacity. It is unclear from the DEIS that such a rupture would be detected within one hour. The FEIS should describe specific precautions and instrumentation that would be implemented at each site to immediately check ruptures. We urge NRC to require pressure sensors and automatic shut-off systems on all major pipelines and an electronic automatic telephone dialing system to alert all appropriate response personnel (e.g., HRI, police and fire departments) as well as all local residents that could be exposed in the event of a hazardous or radioactive material release emergency.

The DEIS states that all significant pipe breaks must be reported to NRC. The FEIS should specify what would constitute a "significant" pipe break or rupture.

According to the DEIS (p. 4-10), soil contaminated by a spill would be removed and disposed of in retention ponds. The FEIS should specify the standard required for cleanup/decontamination of radioactive or hazardous material spills in the project areas.

Waste Management

The FEIS should discuss the current and anticipated availability of radioactive waste disposal sites that could accept waste (including sludges and brines) from the proposed project.

Wastewater would be stored in retention ponds until treatment (DEIS, p. 2-14). The FEIS should discuss disposition of the sludge from these ponds and clarify how access to these ponds would be restricted to protect humans and wildlife.

The DEIS (p. 2-19) indicates that aquifer bleeds during uranium recovery could amount to one percent of the flow rate, or 40 gallons per minute at each site. Discontinuous liquid wastes would also be generated from production, especially from periodic flushing of depleted eluant. Other waste streams would include uranium precipitation and filter washings. HRI proposes to collect these wastes and treat them in the brine concentrator. The specific compositions, amounts, and disposition of liquid wastes generated annually are unclear and should be discussed in the FEIS.

Air Quality

The proposed facilities would be licensed by the NRC to possess Source and Byproduct Material. As such, the facilities would be subject to the requirements of the Radionuclide National Emissions Standards for Hazardous Air Pollutants (NESHAP), 40 CFR Part 61 Subparts A and I. Subpart A provides general requirements under the NESHAP, and Subpart I sets forth requirements specific to the NRC-licensed facilities. Under Subpart A, the owner/operator must submit an application to EPA to construct the facility. Subpart I describes the information required in an application and also provides the criteria for demonstrating exemption from the application requirement (see § 61.106(b)(1)).

Even if the proposed facilities were exempt from the requirements for "application to construct" and from annual reporting under Subpart I, the owner/operator nonetheless would be responsible for performing all the evaluations specified by Subpart I, for maintaining records of these evaluations and for providing these evaluations upon demand by EPA. Such evaluations include the determination of the potential radiological dose to the public, via the use of the COMPLY computer code or other approved methods, the determination of the need to monitor emissions as well as the need to apply for EPA approval to construct or modify, and report annually. Please note that, regardless of the requirement to obtain EPA approval to construct, the facilities

would be subject to the NESHAP emission standard and would be in violation if the standard is exceeded, whether due to normal or off-normal (accident) conditions.

As of this writing, neither EPA-Region 9 nor EPA-Region 6 has received an application to construct this facility, under Subpart I. The DEIS does not identify Subpart I as an applicable requirement. The FEIS should discuss the requirements of Subpart I which are applicable to the proposed project. (For further information on NESHAP requirements, you may contact Mr. Shelly Rosenblum at (415) 744-1047).

Failure to comply with Subpart I is punishable by a fine of \$25,000 per day per violation. Violations of Subpart I are not limited to violations of the emissions standard. Violations also include violations of the requirements to submit an application to construct or modify, notify EPA of start-up, maintain records, and have a quality assurance program; and violations of the reporting requirements and requirements concerning monitoring of emissions.

Table 4.7 in the DEIS (p. 4-11) shows estimated source terms for gaseous and particulate emissions from diesel drilling equipment. The FEIS should provide total project emissions (in pounds per day) for all operations and construction activities.